CLAIMS

What is claimed is:

1. A sensing system comprising
(a) a signal generator that produces wide band transmit signals that have an equivalent representation in a frequency domain that is indicated by a frequency spectrum, and
(b) a transducer device that converts said wide band transmit signals to wide band wave signals that propagate in a medium as indicated by propagating wavefronts, where said medium is a combination of different materials, where said propagating wavefronts propagate in said medium where said different materials cause different signal attenuation that variably attenuates said wide band wave signals that are distributed over said wavefronts, and
(c) attenuation leveling material having attenuation that matches attenuation of a subject of examination, and a device to arrange said attenuation leveling material such that said propagating wavefronts propagate through materials having approximately the same attenuation for any single frequency, to cause uniformity in amplitude of said wide band wave signals that are distributed over propagated wavefronts, for said any single frequency, and
(d) a receiving device that responds to said propagated wavefronts to produce wide band received signals, and
(d) a signal modification device that modifies said wide band transmit signals to produce pre-compensated signals that compensate for propagation effects such that said wide band received signals are uniform in amplitude over a frequency spectrum.

2. A sensing system according to claim 1 and a vacuum device that improves contact between said conforming surface and said surface of said subject of examination.

3. A sensing system according to claim 1 and a conforming surface to isolate coupling fluid from a surface of a subject of examination, and contact enhancing gel that improves transfer of ultrasonic wave signals between said conforming surface and said surface of said subject of examination.

4. A sensing system according to claim 1 where said attenuation leveling material is an attenuating fluid.

5. A sensing system according to claim 1 where said attenuation leveling material is an attenuating fluid that has low scattering properties.

6. A sensing system according to claim 1 where said attenuation leveling material is an attenuating fluid that magnitude of scattering does not add to an effect of scattering of a tissue type being examined.

7. A sensing system according to claim 1 where said attenuation leveling material is evaporated milk.

8. A sensing system according to claim 1 where said attenuation leveling material is a gel.

9. A sensing system according to claim 1 where said fairing device is a flat Mylar sheet.

10. A sensing system according to claim 1 where said fairing device is a thin sheet of material stretched over a frame so that it is shaped by said frame.

11. A sensing system according to claim 1 where said conforming surface is a thin rubber sheet.

12. A sensing system according to claim 1 where said system is used for breast imaging.

13. A sensing system according to claim 1 where said transducer operates within attenuating fluid.

14. A sensing system according to claim 1 where said transducer scans laterally without variation in operating power levels.

15. An ultrasonic stand-off pad that couples signals between a transducer and a body to be examined, where said stand-off pad contains attenuating material, where said transducer produces wave signals that are wide band transmit signals, and said transducer receives wave signals to produce wide band received signals, and said wide band transmit signals are pre-compensated to cause said wide band received signals to be approximately uniform in amplitude over a wide frequency bandwidth.

16. An ultrasonic stand-off pad according to claim 15 where said pad causes attenuation leveling.

17. An ultrasonic stand-off pad according to claim 15 where attenuation of said pad enables operation of ultrasonic equipment without power reduction.

18. An ultrasonic stand-off pad according to claim 15 where said pad contains milk.

19. An ultrasonic stand-off pad according to claim 15 where said pad contains evaporated milk.

20. An ultrasonic stand-off pad according to claim 15 where said pad is equipped with a port that enables filling with a syringe.

21. An ultrasonic stand-off pad according to claim 15 where said pad is connected to a reservoir by a tube so that attenuating fluid can allow volume of said pad to vary.

22. An ultrasonic stand-off pad according to claim 15 and a vacuum device to assure close contact with a body surface.

23. An ultrasonic stand-off pad according to claim 15 and an ultrasonic transducer device that is operated at an angle not perpendicular to skin surface of a body to be examined.

24. An ultrasonic stand-off pad according to claim 15 and an ultrasonic transducer device that is operated in relation to uneven body surfaces.

25. An ultrasonic stand-off pad according to claim 15 and medical operations that produce images of tissue within a body that is being examined.

26. An ultrasonic stand-off pad according to claim 15 and coupling gel that improves signal transfer.

27. An ultrasonic stand-off pad according to claim 15 where said pad is a container made of thin rubber that is a conforming surface.

28. An ultrasonic stand-off pad according to claim 15 and a device to inject a substance into a subject of examination.

29. An ultrasonic stand-off pad according to claim 15 and apparatus to guide surgical instruments.

30. An ultrasonic stand-off pad according to claim 15 and apparatus to guide injection instruments.

31. An ultrasonic stand-off pad according to claim 15 where said pad is a firm gel.

32. An ultrasonic stand-off pad according to claim 15 where said pad is an attenuating gel having sufficient viscosity that it remains between a transducer and skin of a subject.

33. A system utilizing a combination of attenuation leveling and signal compensation for frequency dependent attenuation.

34. A system according to claim 33 where said system implements an experiment.

34. A system according to claim 33 where said compensation for frequency dependent attenuation is pre-compensation that is accomplished by modifying transmit signals.

35. A system according to claim 33 where said compensation for frequency dependent attenuation is compensation that is accomplished by modifying received signals.

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